Comber Consultants Pty Ltd ABN 96 109 670 573
Archaeology/Heritage Management ✢ Dispute Resolution Services
99 Edwin Street North, Croydon NSW 2132 ✢ Phone 02 9799 6000 ✢ Fax 02 9799 6011 ✢ jillian.comber@comber.net.au

Aboriginal Archaeological and Cultural Heritage Assessment

Barangaroo: Stage 1

by

Jillian Comber and Tory Stening

Report to Casey & Lowe Pty Ltd
on behalf of Lend Lease

May 2010

Executive Summary

The Barangaroo Delivery Authority propose to redevelop Barangaroo at Millers Point. The aim of the redevelopment is to deliver a mixed use development of commercial, retail and residential buildings, as well as the creation of foreshore recreational space. Lend Lease is the selected development proponent for Stage 1 of the redevelopment.

To ensure that the Aboriginal cultural heritage significance of the subject area is not adversely impacted upon by the proposed development, Casey & Lowe on behalf of Lend Lease have commissioned this Aboriginal cultural heritage assessment.

This report concludes that the subject area has the potential to contain Aboriginal sub-surface cultural deposits and recommends that a program of sub-surface testing be undertaken prior to commencement of the redevelopment works.

Table of Contents

1.0 Introduction 1
1.1 Background 1
1.2 Location and Site Description 1
1.3 Proposal 5
1.4 Aim of the project 7
2.0 Aboriginal Partnership 8
3.0 Environmental Context 9
3.1 Topography 9
3.2 Geology 9
3.3 Vegetation 9
3.4 Current Land Use and Disturbance 10
4.0 Archaeological Context 13
4.1 Sydney region 13
4.2 Sydney Harbour 14
4.3 The Study Area 15
4.4 Site Prediction 15
5.0 Site Inspection 17
5.1 Methodology 17
5.2 Effective Survey Coverage 17
5.3 Results 18
6.0 Legislation 21
6.1 National Parks and Wildlife Act 1974 21
6.2 Part 3A, Environmental Planning and Assessment Act, 1979 21
7.0 Recommendations 22
8.0 References 23
Photographs 25
Appendix A 29
Appendix B 30

1.0 Introduction

1.1 Background

The Barangaroo Delivery Authority propose to redevelop the former Patrick Stevedores Container Shipping Terminal which is now known as the Barangaroo site. Barangaroo is part owned and currently controlled by the Barangaroo Delivery Authority (BDA). Lend Lease is the selected development proponent for Stage 1 of the redevelopment. The aim of the redevelopment is to deliver a mixed use development of commercial, retail and residential buildings, as well as the creation of foreshore recreational space.

The project is a "major project" to be determined under Part 3A of the *Environmental Planning & Assessment Act 2003.* To ensure that the Aboriginal cultural heritage significance of the subject area is not adversely impacted upon by the proposed redevelopment, Casey & Lowe on behalf of Lend Lease, have commissioned this Aboriginal cultural heritage assessment.

1.2 Location and Site Description

Barangaroo is an area of approximately 22 hectares which is situated at the north western edge of the Sydney Central Business District (Sydney CBD). Barangaroo is bound to the south by Darling Harbour and the King Street Wharf, to the east by Hickson Road, Millers Point and the Rocks, to the northeast by Walsh Bay and the harbour to the west. Barangaroo comprises Lots 1–6, DP 876514, Parish of St Phillip, in the Sydney Local Government Area. It contains a flat bitumen and concrete deck that formerly comprised the container shipping wharf. Most of the buildings have been removed from the site.

Figure 1 shows the location of Barangaroo on the 1:250,000 topographic map. Figure 2 shows the location of Barangaroo on the 1:25,000 topographic map.

Stage 1 of the Barangaroo redevelopment is located in the southern section of Barangaroo. It is an area bounded by Hickson Road at the east, Shelly Street to the south and the concrete wharf to the north and west. The construction of Blocks 1–4 forms the basis of the Barangaroo Stage 1 development. The footprints of the proposed Blocks 1–4 are shown in Figure 3.

Figure 1: Location of Barangaroo circled in yellow.
(1:250,000 Sydney Special ED2 – 1998 topographic map)

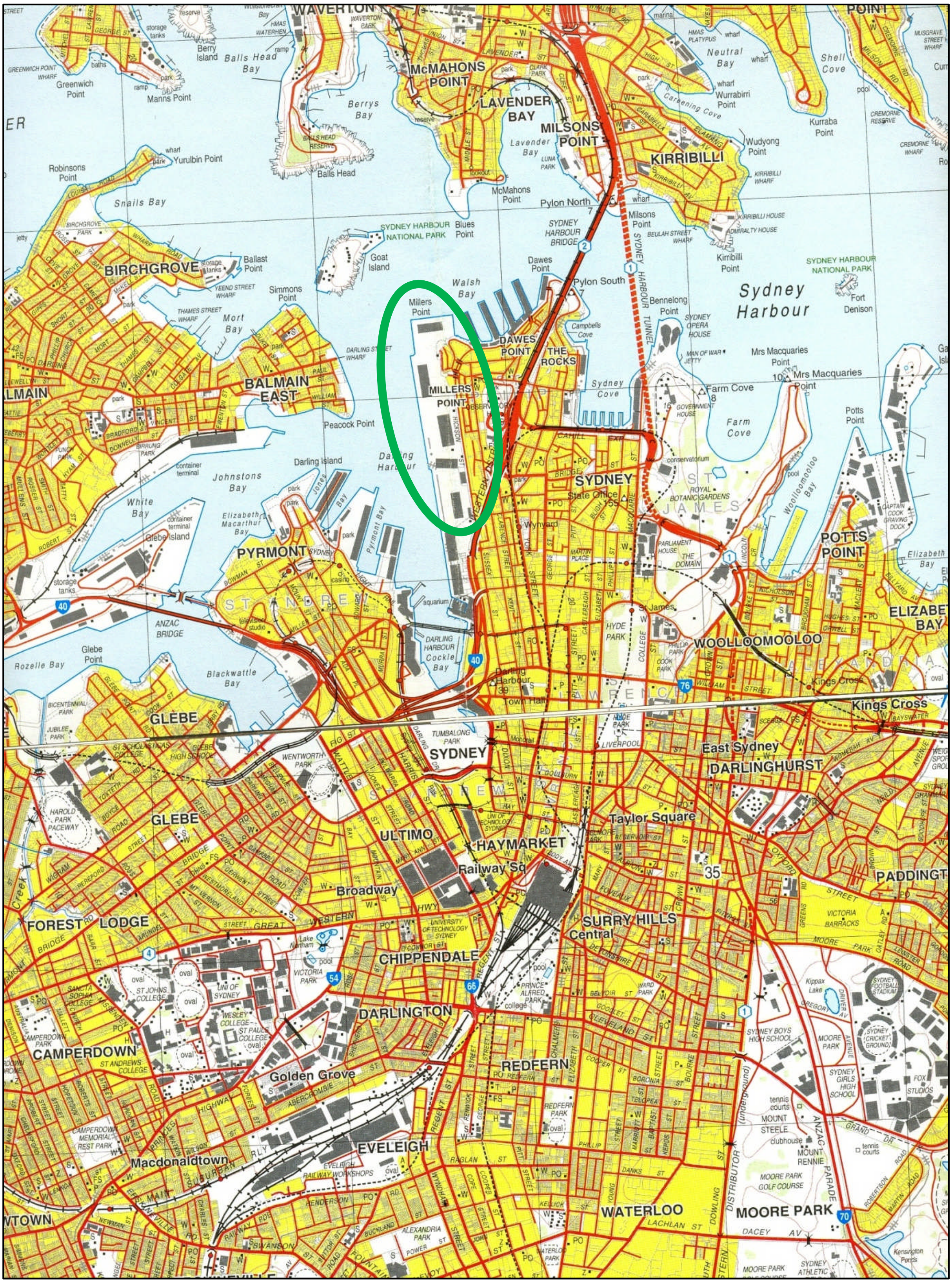

Figure 2: Location of Barangaroo circled in green
(Composite map of the Parramatta River 1:25,000 9130-3N Third Edition topographic map and the Botany Bay 9130-3S Third Edition topographic map).

Figure 3: Aerial photo showing the extent of Stage 1 development which comprises Blocks 1 - 4. The proposed footprint of individual Blocks 1 – 5 are outlined in red. Block 5 is a later development stage. The purple line indicates the location of the basement/carpark.
(courtesy Casey & Lowe)

1.3 Proposal

The development of Barangaroo has been divided into a number of Stages. This report is only concerned with Stage 1.

The proposal for Stage 1 is described below:

- The demolition of the existing buildings;
- Redevelopment of the Stage 1 site to provide for a mix of commercial, residential, tourist, retain and community spaces;
- At least 3ha of space for public recreation;
- Inclusion of basement car parking;
- Enlarged Southern Cove;

Figure 4 is a plan showing the area occupied by each development Block. It should be noted that Block 4 and the north-east corner of Block 3 contain extensive contamination requiring remediation, indicated by the blue hatched area on Figure 4.

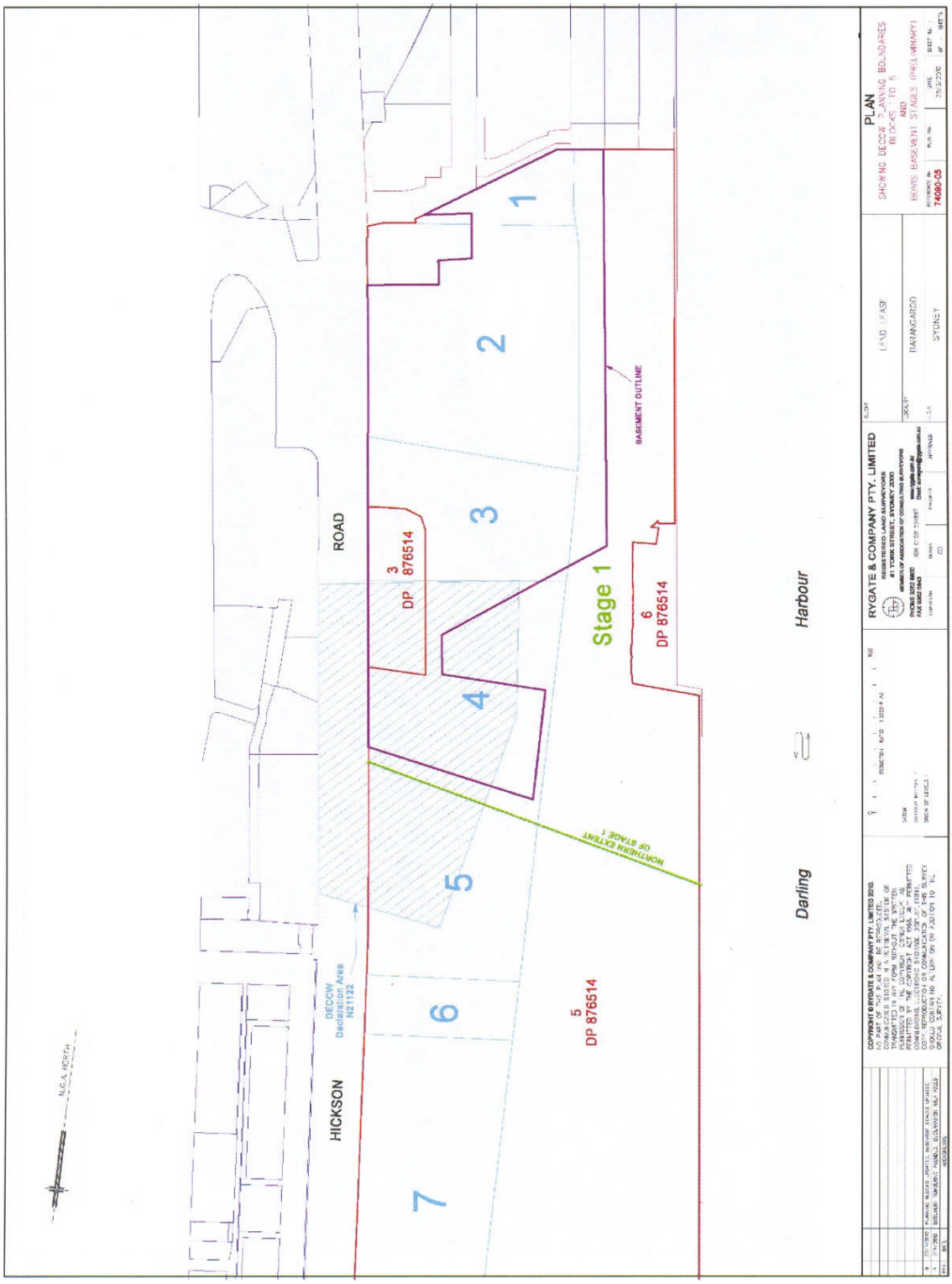

Figure 4: Plan showing the development blocks (Blocks 1–7, which are outlined in blue).
Stage 1 comprises the construction of Blocks 1–4.
Blocks 5–7 are a later development stage.
The purple outline is the footprint for the basement and underground car parking.
The blue hatched area indicates the area of contamination requiring remediation.
(courtesy of Casey & Lowe)

1.4 Aim of the project

The consultant was commissioned to:

a) Undertake background research, including a search of the Department of Environment, Climate Change and Water (DECCW)'s Aboriginal Heritage Information Management System (AHIMS);

b) Undertake an archaeological assessment of the subject land to determine whether any Aboriginal sites or places are located within the area of the proposal or have the potential to exist within the study area, and to record any such sites located. Such assessment to be undertaken in partnership with the Metropolitan Local Aboriginal Land Council as detailed in c) below;

c) Consult with the Metropolitan Local Aboriginal Land Council to ascertain Aboriginal concerns and interests in respect of the subject land and the project;

d) Assess the impact of the proposed development on Aboriginal cultural heritage and detail Aboriginal views and concerns in respect of the subject project;

e) Provide management recommendations to enable the appropriate management of Aboriginal cultural heritage values within the study area.

2.0 Aboriginal Partnership

Aboriginal culture is dynamic and continuous. It includes the tangible and intangible and links people over time to their community and land. It is important to recognise that Aboriginal people have the right to protect, preserve and promote their cultural heritage. In recognition of that right, the Metropolitan Local Aboriginal Land Council (MLALC) was invited to take part in the project and participated fully in this cultural heritage assessment. The MLALC's representative, Mr Allen Madden, undertook a survey and cultural heritage assessment with the Consultant on Friday 16th April 2010.

Prior to the site survey and assessment being undertaken, the Metropolitan Local Aboriginal Land Council were contacted by phone to discuss the project and their participation. Maps were forwarded to MLALC which clearly outlined the location of the proposed development.

A copy of the draft report has been forwarded to MLALC for their comment and their response will be attached at Appendix A to the final report. The recommendations contained in this report have been formulated in consultation with the MLALC.

Mr Allen Madden of the MLALC has advised that he has been in discussion with the Barangaroo Delivery Authority about the need to include Aboriginal interpretation in the redevelopment of the site. They would like it included in this report that they wish to see interpretation of Aboriginal history included in the redevelopment.

3.0 Environmental Context

3.1 Topography

Barangaroo is located in the central portion of the Sydney Basin. The Sydney Basin is characterised by contrasting landscapes of rugged sandstone escarpments and gently undulating hills over shale (Herbert 1980: 21; Sydney 1:100,000 geological map).

The original topography of the area consisted of a steeply sloping foreshore with a gently rounded top (Austral 2010: 37) and the original shoreline is located in two small sections at the southern end of the study area and a larger portion in the north eastern section of the Barangaroo site.

Today, Barangaroo is the result of European activities including harbour reclamation for the construction of wharves and the construction of the shipping container terminal.

3.2 Geology

The geology of Sydney Harbour consists of the Wianamatta Group of shales which overlies Hawkesbury Sandstone. The Wianamatta Group consists of a lower formation of Ashfield Shale, which grades upwards into a fine sandstone siltstone laminate culminating in the overlying Bringelly Shale (Sydney 1:100,000 geological map).

The Wianamatta Group does not provide a good variety of lithic material suitable for stone tool manufacture. Within the Bringelly Shales are claystones, siltstones and laminate. These thin shales are not strong enough for use in stone tool manufacture. However, the Bringelly Shale also comprises tuff which is a highly siliceous fine grained material suitable for small tool manufacture. In addition the Hawkesbury Sandstone provides materials suitable for the manufacture of ground edge axes and surfaces suitable for engraved art. Hawkesbury Sandstone also weathers into overhangs and shelters suitable for habitation and protection from the elements. The quartz and claystone which weather from the sandstone also provide material for artefact manufacture.

3.3 Vegetation

The vegetation of the Sydney Basin would once have consisted mainly of dry sclerophyll or open woodland on the higher sections where the soils are sandy and well drained, whilst the slopes would have supported an open Sydney Turpentine Ironbark forest. The alluvial soils would have supported a river-flat forest, including various *Eucalypt* species and *Angophoras*. The open woodland species would have included *Eucalyptus siberi* (Silvertop Ash), *Eucalyptus piperita* (Sydney Peppermint), *Eucalyptus sclerophyllia* (Scribbly Gum), plus *Corymbia* with an understorey of *Banksia serrata* (Old Man Banksia), *Banksia spinulosa* (Hairpin Banksia), *Banksia integrifolia* (Coast Banksia) and various *Acacia spp.*, including *Acacia longifolia*. Flowering shrubs would have included *Telopea speciosissima* (Waratah) and *Boronia serrulate* (Native Rose), whilst groundcover species would have included *Grevillia laurfolia* and *Persoonia chamaepitys*. Clumps of *Lomandra longifolia*would also have grown on headland areas. In addition, various heathland communities would have existed along coastal areas (Baker 1986).

Such vegetation would have provided a rich and varied food source. Flowers from the *Eucalyptus* and *Banksias* provide a rich nectar. *Acacia* pods can be eaten and the bark used medicinally. This vegetation also supported a variety of animal life associated with Aboriginal

diet. This included possums, various wallabies and other small marsupials, as well as birds and lizards. Bark and wood suitable for spears, shields, water and/or food vessels (coolamons) and other implements would have been available from large trees. (Low 1989).

However, the urbanisation of the Sydney Basin has ensured that the landscape and its vegetation has been dramatically altered and no longer resembles the pre-contact landscape.

3.4 Current Land Use and Disturbance

Settlement at Barangaroo began early in Sydney's colonial history. The first wharf was constructed in Cockle Bay in 1811 on the order of Governor Macquarie. From the 1830s development of the shore line to accommodate the shipping industry began and included wharf construction, land reclamation and the quarrying of the sandstone cliffs at the base of Observatory Hill (Casey & Lowe 2010).

The topography of the Millers Point promontory discouraged the residential settlement of the study area, however windmills for the production of wheat were constructed on the hill behind the promontory (now known as Observatory Hill) from 1797 (Casey & Lowe 2010).

The present study area is comprised of a bitumen and concrete deck forming the shipping container terminal which overlies portions of the original shore line in the north and south east of the study area and the remainder of the site overlies reclaimed land. The majority of the shipping container terminal buildings have been removed. To the west of the study area is Sydney Harbour, to the north east is Walsh Bay, to the east is Hickson Road, Millers Point and the Rocks, and to the south, the International Passenger Terminal, the King Street Wharf and Darling Harbour.

Due to the industrial uses of the area, Blocks 3 and 4 contain extensive contamination. The following contaminants are of concern:

- Polycyclic aromatic hydrocarbons (PAHs);
- Benzene, toluene, ethylene and xylenes (BTEX);
- Total petroleum hydrocarbons (TPHs);
- Ammonia;
- Phenol; and
- Cyanide.

Block 3 is located within the Other Remediation Area (South). The contamination in this area is considered such that a "comprehensive program of archaeological excavation, mapping and recording" will be possible (AECOM 2010: 4).

Block 4 is within the Voluntary Management Proposal (VMP) and Project Delivery Agreement (PDA) Remediation Works Area. AECOM (2010b: 3) have stated that the nature of contamination within the VMA and PDA Remediation Works Area prohibits hand excavation, machine excavation and wet sieving of any material from this area.

AECOM's (2010) report is attached at Appendix B.

Figure 5 below shows the remediation areas.

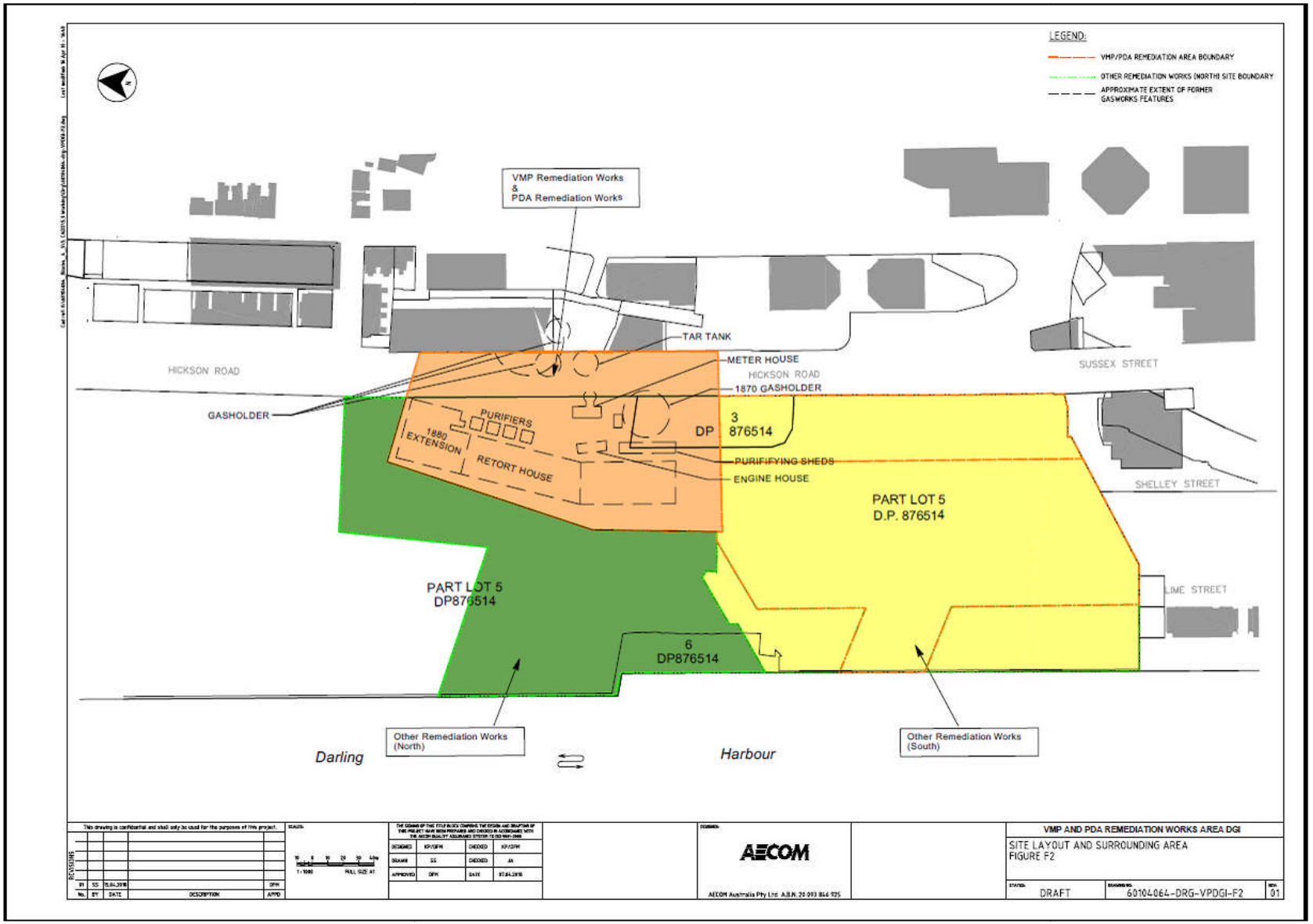

Figure 5: Showing the areas where remediation will be undertaken as part of Stage 1 redevelopment (courtesy of AECOM)

4.0 Archaeological Context

4.1 Sydney region

Many surveys have been undertaken in the Sydney region which indicate the richness of the archaeological resources and which provide information about Aboriginal occupation within the region. In particular, Attenbrow (2002) has excavated a range of sites within the Sydney Basin. The aim of her study was to identify local geographic variation and temporal changes in the subsistence patterns and material culture of the people of this area. She excavated sites at Balmoral Beach, Cammeray, Castle Cove, Sugarloaf Point (Lane Cove River), Darling Mills State Forest, Winston Hills, Vaucluse and Cumberland Street in The Rocks. Dates for initial occupation vary from approximately 10,000 years BP at Darling Mills to approximately 450 years BP at Cumberland Street, The Rocks.

The oldest dated occupation for the Sydney region is 15,000 years BP from the Shaws Creek K2 rock shelter on the Nepean River (Kohen 1984; Nanson et al 1987). However these dates must be considered in association with environmental data related to sea level rises. The Sydney region that we know today is vastly different to the landscape of 15,000 years ago.

The period of maximum glaciation was 15,000 – 18,000 years BP. Therefore the date of the K2 rock shelter and Attenbrow's Darling Mills site indicate that Aboriginal people lived throughout a period of extreme environmental change. During this period, sea levels were up to 130m below current levels (Nutley 2006: 1). About 10,000 years ago as temperatures began rising at the end of the last ice age, the polar ice started melting and sea levels rose. The rising sea levels forced people to abandon coastal sites and move inland, with the result that the oldest coastal sites were inundated. By about 6,000 years ago, rising water levels had flooded the coastal plain forming the Sydney landscape that we know today. The vast majority of sites in the Sydney region date to around 5,000 years BP, after sea levels had stabilised. Whilst research into submerged indigenous sites is now being undertaken (Nutley 2006), there are few sites in the Sydney area that are known to date beyond 10,000 years BP. Therefore research undertaken to date has focused on subsistence patterns and cultural change, e.g. Attenbrow (2003).

Attenbrow's (2003) study of the "Sydney region" extended from the eastern coast to the Hawkesbury-Nepean River to the north and west and as far south as Picton (2002: xiii), which includes the resent study area. At the time of publication (2002), Attenbrow noted that approximately 4,340 Aboriginal sites had been registered with DECCW's Aboriginal Heritage Information Management System (AHIMS) in the Sydney region (Attenbrow 2002: 48). Middens and open campsites comprised just over half of the recorded sites (Attenbrow 2002: 48 – 49). From both the archaeological evidence and historical records she noted that the main focus of occupation was "on the valley bottoms and shorelines" (Attenbrow 2002: 47). In addition, the evidence indicates that occupation was greater on the coastal/estuarine environments rather than in the hinterland/freshwater environments and on the Hawkesbury sandstone rather than the Wianamatta shales (Attenbrow 2002: 51). Her work produced a great deal of information in respect of the people of the Sydney region, their social organisation and land use patterns. Her (2002: 152 – 155) analyses indicates that prior to 5,000 years ago occupation in the Sydney region was not intensive and was only by small groups of people. It was not until sea levels stabilised about 5,000 years ago that more intensive occupation began with many open sites being first occupied in the last 1,500 years.

4.2 Sydney Harbour

The ethnographic data (Austal 2010:20) indicates that middens were once prominent around the foreshores of Sydney Harbour. From the early 1800s settlers began using the extensive middens to produce quicklime.

The 1883 publication Aborigines of Australia and the 1880 Journal of the Royal Anthropological Institute recorded a rock engraving at the area now known as Dawes Point Park, approximately 70m to the east of Barangaroo. The engraving was either of a whale or a shark with the figure of a man at its head. This engraving has since been destroyed, probably during the construction of the Sydney Harbour Bridge (AHIMS 45-6-0030).

In 1985 Lampert excavated a midden and camp site at Mort's Bond Store approximately 100m to the east of the study area. The site had been truncated by construction of the building and was in a highly disturbed condition. It contained shell and bone, as well as stone artefacts manufactured from red and grey silcrete, quartz, quartzite and chert. The artefacts were comprised of flakes, flaked pieces and cores. He hypothesised that the stone material was sourced from quarries on the Cumberland Plain (Lampert 1985).

An engraving was recorded "on upright surfaces in creek bed" at Goat Island (AHIMS 45-6-0811). These engravings include a whale, kangaroo and fish. Three disturbed middens have also been recorded on Goat Island (AHIMS 45-6-0811; 45-6-1957; 45-6-2382). Goat Island itself is extremely important, as it was recorded in 1798 as being owned by Bennelong, who played a significant role in early Aboriginal - European relations. It was also recorded as being used by Aboriginal people for imprisonment prior to European settlement. Deputy Judge Advocate David Collins was required by the Colonial Government "to observe, record and if possible reconcile the Aborigines". In 1798 he published details of Bennelong's relationship to Goat Island. This is the first official written account of ownership of land by an Aboriginal person (Gollan 1993).

A midden was recorded at Bennelong Point, approximately 1.25km to the east of Barangaroo. The shell from this midden had been collected by the convicts to burn into lime to provide building mortar (AHIMS 45-6-1615).

Another midden was uncovered during building works near the historic building "Lilyvale" on the corner of Cumberland and Essex Streets, The Rocks, approximately 0.5km east of Barangaroo. It had been highly disturbed by the construction of terrace houses in the 1830s and was subsequently destroyed by the construction of a hotel (AHIMS 45-6-1853).

During historic excavations in relation to the construction of the eastern distributor at Woolloomooloo, an artefact scatter was uncovered. The site was subsequently excavated by Brayshaw (AHIMS 45-6-2580). This site, which was located near a spring, contained four silcrete, four chert, two quartz artefacts plus one quartzite and one chalcedonic silica artefact. They were found at a depth of about one metre in "disturbed topsoil, overlain by fill" (AHIMS 45-6-2580: 2).

During historic excavations in respect of a development located approximately 1.5km to the south east of Barangaroo at William Street, an artefact scatter was uncovered. This was subsequently excavated and the artefacts included fine quartz debitage and cores, silcrete flakes and tuff cores and flakes (AHIMS 45-6-2651).

Development works at Angel Place, approximately 0.8km to the south east of Barangaroo, uncovered stone artefacts. This site was subsequently excavated by Steele who retrieved three broken flaked pieces in "partially disturbed topsoil mixed with alluvial silts" (AHIMS 45-6-2581). Steele also recorded a potential archaeological deposit (PAD) on George Street, opposite Wynyard Station (AHIMS 45-6-2796). Neither his assessment report nor subsequent excavation report were available from DECCW, therefore no further comment about his site can be made.

In 2002 Steele excavated a site on the corner of Broadway and Mountain Streets in relation to the Quadrant Development, approximately 2.5km to the south west of Barangaroo. He uncovered seven quartz and six silcrete artefacts.

Steele (2006) also undertook an assessment and excavations at a development site bound by Kent, Erskine, Napoleon and Sussex Streets, which became known as the KENS site and was located approximately 0.5km to the south east of Barangaroo. Steele retrieved a large assemblage of 952 artefacts which were predominantly manufactured from silcrete with some tuff and quartz artefacts (Steele 2006: 97). He interpreted the site as being occupied between 2,800BP to 1788. This site was located in a similar environmental context to the present study area, i.e. in a coastal environment near an original shoreline.

Archaeological excavations undertaken in 2009 at Darling Walk (Comber & Stening in preparation), approximately 1.7km to the south of Barangaroo, revealed a midden in a highly disturbed context. Ten stone artefacts were located and these comprised silcrete, chert and quartz flakes and flaked pieces. This site was located in a similar environmental context to Barangaroo, being predominantly reclaimed land with a small portion of original shoreline that had been significantly developed.

With the exception of the Darling Harbour midden the majority of these sites have been uncovered during historical archaeological excavations in relation to development proposals. The Darling Harbour midden was excavated as a result of management recommendations from an assessment (Comber & Stening in prep) prior to development. A few of the sites were recorded at contact. None have been recorded and analysed as a result of a systematic regional assessment. However, all of these sites are located in the coastline/estuarine environment on Hawkesbury Sandstone. These locations confirm Attenbrow's model of coastal occupation, i.e., that occupation was greater in these environments and on the Hawkesbury Sandstone than in the hinterland/freshwater environments.

4.3 The Study Area

A search of the Department of Environment, Climate Change and Water (DECCW)'s Aboriginal Heritage Information Management System (AHIMS) indicates that no known Aboriginal sites have previously been recorded within or in the vicinity of the Barangaroo site.

4.4 Site Prediction

On the basis of the above environmental and archaeological information, it could be expected that subsurface archaeological deposits containing artefact scatters and/or middens may be located within the eastern portion of Barangaroo Stage 1 redevelopment,

near the original shoreline. The remainder of the site was originally harbour and has since been reclaimed. It is not expected that sites that may have existed prior to sea level rises would have survived the process of inundation (Nutley 2006) and later land reclamation activities. Within the eastern section of the study area, if any sites are located, it is expected that they will be in a disturbed context. Since the study area is completely covered in concrete and bitumen, such sites will no longer visible. Scarred or carved trees are not expected, as the study are does not contain any remnant vegetation. Similarly rock shelters, paintings, engravings or axe grinding grooves are not expected, as the combination of colonial development, land reclamation and the construction of the shipping container terminal would have destroyed any such evidence.

5.0 Site Inspection

5.1 Methodology

This project was conducted in three stages, which were background research, site inspection and report production, as detailed below.

Stage 1: Background Research
Prior to the field component of this project, the Aboriginal Heritage Information Management System of the Department of Environment and Climate Change was consulted. Site data, associated documents and archaeological survey reports held in this database were reviewed. Environmental information relating to Aboriginal land use was also researched. Such research facilitated the understanding of the potential nature of the sites and site patterning in the region, which enabled the predictive statement to be made. It also provided an archaeological and environmental context within which a significance assessment could be made if any Aboriginal sites were located during the field survey.

Stage 2: Field Survey
The archaeological site inspection and field assessment was undertaken on Friday 16th April 2010 with the following people present:

- Jillian Comber, Archaeologist, Comber Consultants
- Tory Stening, Archaeologist, Comber Consultants
- Mr Allen Madden, Site Officer, Metropolitan Local Aboriginal Land Council

The nature of the development was discussed and the site inspected by all of the above.

Stage 3: Report Preparation
After completing the site inspection, a draft report was prepared and provided to Casey & Lowe, Lend Lease and the Metropolitan Local Aboriginal Land Council. On receipt of their comments this report will be finalised and a final copy provided to each of the above.

5.2 Effective Survey Coverage

Ground surface visibility, which refers to the amount of bare ground visible during the field survey, was nil. As previously mentioned the existing site comprises a flat bitumen and concrete deck

The visibility of some site types, such as open artefact scatters, is dependent on ground visibility and exposure. The National Parks and Wildlife Service's guidelines suggest that this information is to be presented in a table which quantifies and details the local detectability (NPWS 1997:17).

However as the study area is a bitumen and concrete deck obscuring the original ground surface this table will not be used.

5.3 Results

No known sites were recorded within the study area. As the study area is developed, there was no surface visibility. However, the possibility that subsurface artefacts still remain despite later disturbance must be considered.

The background research, as contained in this report, provides information to enable an assessment to be made as to whether any sub-surface Aboriginal archaeological deposits could remain.

The excavation undertaken by Steele (2006) at the development site bound by Kent, Erskine, Napoleon and Sussex Streets, which became known as the KENS site was located in a similar environmental context as Barangaroo, i.e. in a coastal environment near an original shoreline The KENS site is only 0.5km to the south east of Barangaroo. Steele retrieved a large assemblage of 952 artefacts (Steele 2006: 97).

The excavation undertaken by Comber and Stening (in preparation) at Darling Harbour also provides relevant data to enable a comparative analysis to be made. That excavation was located in a similar context to the present study area, i.e. a foreshore area which had been developed during the early European settlement of the Colony and which was later the subject of reclamation and ongoing development.

Therefore, it is possible that sub-surface Aboriginal archaeological deposits may also remain within the present study area in the form of stone tools or remnant midden material. Given the proximity of known sites around the Sydney Harbour foreshore, a program of subsurface testing should be undertaken prior to construction of the proposed development. Such testing should be undertaken in the area where the original shoreline was located. Testing in the areas of reclaimed land is not necessary. Figure 6 below shows the proposed footprint of the basement and underground carparks, and the shoreline as mapped in 1822 This plan indicates the area where testing should be undertaken. Figure 7 shows a more detailed plan of Stage 1 Barangaroo redevelopment overlaid with the 1822 map which shows the shoreline.

The location of the contaminated soils must be taken into account when determining an appropriate testing strategy. A research design and management plan should be developed prior to the commencement of such testing, clearly outlining the location of the contaminants and an appropriate testing methodology.

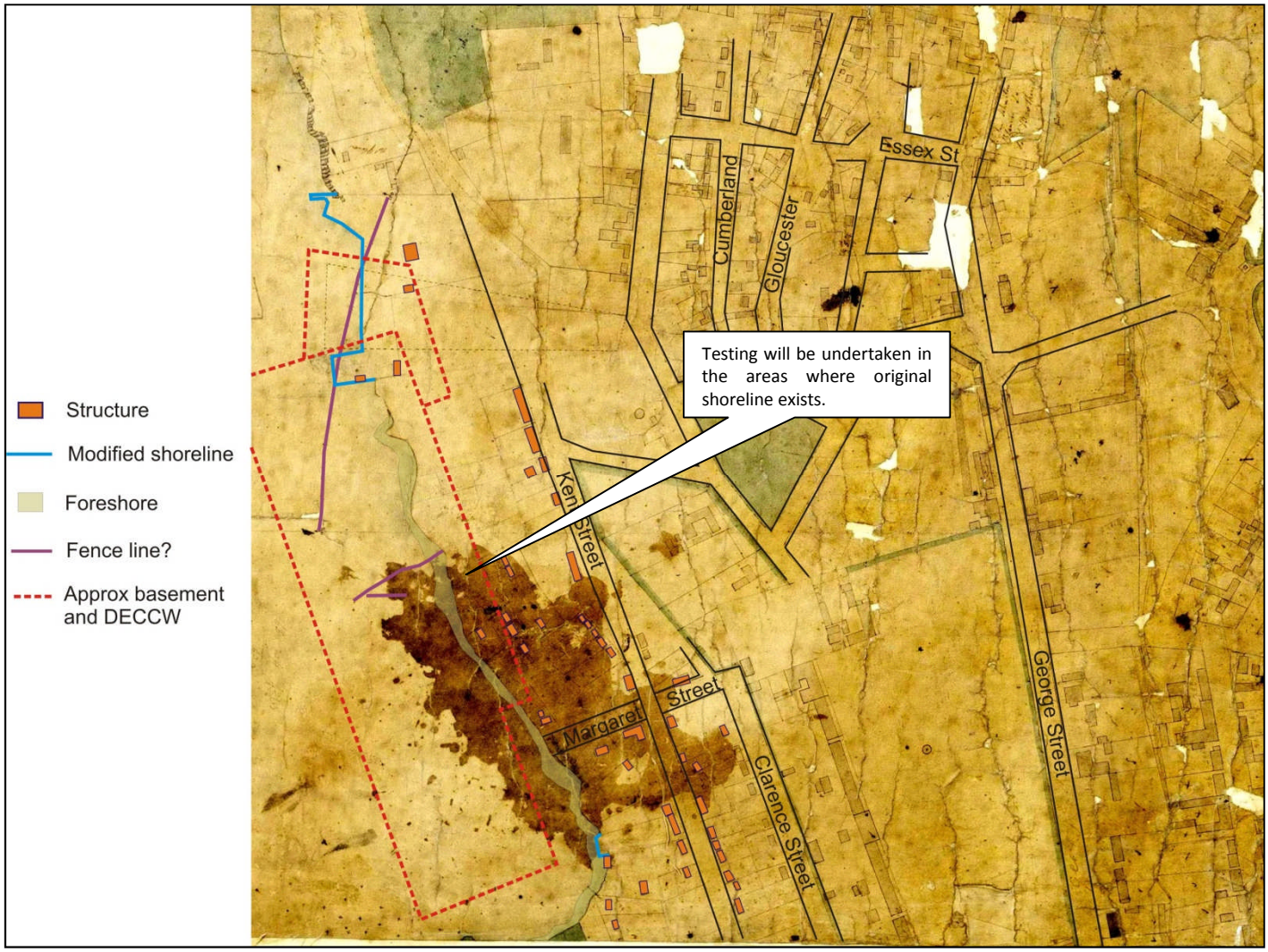

Figure 6: Plan showing the footprint of the proposed basement and underground carparks of Barangaroo Stage 1 and the shoreline as mapped in 1822. (courtesy of Casey & Lowe)